Robert B. Ross
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Current Activities

- **Parallel Virtual File System**
  Lead Architect, guiding direction of project development, helping coordinate international team of researchers and developers to create a production-quality parallel file system that is also an excellent starting point for parallel I/O research.
  http://www.pvfs.org/

- **SciDAC Scientific Data Management Center**
  Argonne PI and Area Leader for Storage Efficient Access, working with computational scientists and other experts in scientific data management to design, implement, and support data management solutions tailored to the needs of DOE computational science applications.
  http://sdmcenter.lbl.gov

- **SciDAC Institute for Ultra-Scale Visualization**
  Argonne PI and Associate Director, helping integrate parallel I/O best practice into scalable parallel visualization algorithms to enable better understanding of petascale datasets.
  http://www.iusv.org

- **MPICH2 MPI Implementation**
  Researching and Developing highly parallel MPI-IO and datatype processing for MPI implementations.
  http://www.mcs.anl.gov/mpi/mpich2/

- **Argonne Leadership Computing Facility**
  Aiding in design and review of parallel I/O system for leadership computing machine.
  http://www.alcf.anl.gov/

- **High-End Computing Inter-Agency Working Group (HEC IWG) FSIO**
  Helping to identify key needs and gaps in current research and development activities in file systems and I/O (FSIO) and organize the community and agencies to address these gaps.

Appointments

2004-present : **Mathematics and Computer Science Division, Argonne National Laboratory**
      Computer Scientist

2004-present : **Computation Institute of The University of Chicago and Argonne National Laboratory**
      Fellow

2004-present : **Department of Electrical and Computer Engineering, Clemson University**
      Adjunct Assistant Professor

2002-2004 : **Mathematics and Computer Science Division, Argonne National Laboratory**
      Assistant Computer Scientist

2000-2002 : **Mathematics and Computer Science Division, Argonne National Laboratory**
Enrico Fermi Scholar

1996-2000 : **NASA Graduate Student Research Program**
Fellow

Education

1994–2000 :   Clemson University (Clemson, SC)
Doctor of Philosophy, Computer Engineering, Focus Area: Computer Architecture

1990–1994 :   Clemson University (Clemson, SC)
Bachelor of Science, Computer Engineering, Minor in Math Science

Honors and Awards

2005   R&D 100 Award Winner for MPICH2
2004   Presidential Early Career Award for Scientists and Engineers
Dept. of Energy Office of Science Early Career Scientist and Engineer Award

Professional Activities

- IPDPS 2002 reviewer, 2007 reviewer

- IEEE Transactions in Parallel and Distributed Systems, 2003-2006 reviewer

- NSF review panelist in 2006

- IEEE Cluster, 2002 reviewer, 2003 program committee member and session chair, 2006 PC member and session chair

- International Journal of Computers and Their Applications, 2006 reviewer

- EuroPVM/MPI 2006 session chair

- SciDAC 2006 organizing committee member

- Journal of Parallel Computing, 2005 reviewer

- High Performance Distributed Computing Conference, 2005 reviewer

- FAST Conference, 2005 reviewer

- DOE Office of Science Early Career Principal Investigator program, 2005 reviewer

- SC2004 tutorial committee member

- NASA Computing, Networking, and Information Systems R&D activities, 2004 reviewer

- SC2003 reviewer

- Special issue of Cluster Computing Journal, 2003 reviewer

- Journal of Parallel and Distributed Computing, 2003 reviewer, 2006 reviewer

- DOE Office of Science Early Career program, 2002 reviewer

Supervisory and Mentoring Activities

- Software programmer supervisor 2003-present

- Postdoctoral researcher supervisor 2004-present

- Ph.D. thesis committee member for Phil Carns and Murali Vilayannur

- Summer student supervisor 2001-present

Publications

Book Chapters and Journal Articles

1. M. Vilayannur, A. Sivasubramaniam, M. Kandemir, R. Thakur, and R. Ross, "Discretionary Caching for I/O on Clusters," Cluster Computing, (9)1:29-44, January 2006.

2. R. Ross, R. Thakur, and A. Choudhary, "Achievements and Challenges for I/O in Computational Science," SciDAC 2005: Scientific Discovery Through Advanced Computing, Journal of Physics: Conference Series, edited by A. Mezzacappa et al, Institute of Physics Publishing, Philadelphia, PA, 2005, pp. 501–509.

3. A. Ching, A. Choudhary, W. Liao, R. Ross, and W. Gropp, "Evaluating Structured I/O Methods for Parallel File Systems," International Journal of High Performance Computing and Networking, 2005.

4. R. Ross and W. Ligon, "Server-side Scheduling in Cluster Parallel I/O Systems," Parallel I/O for Cluster Computing, edited by C. Cerin and H. Jin, Kogan Page Science, Sterling, VA, 2004, pp. 157–182.

5. W. Ligon and R. Ross, "Parallel I/O and the Parallel Virtual File System," Beowulf Cluster Computing with Linux, second edition, edited by W. Gropp, E. Lusk, and T. Sterling, Cambridge, MA, 2003, pp. 493–534.

6. W. Ligon and R. Ross, "PVFS: Parallel Virtual File System," Beowulf Cluster Computing with Linux, edited by T. Sterling, MIT Press, Cambridge, MA, 2002, pp. 391–429.

Refereed Proceedings

1. K. Coloma, A. Ching, A. Choudhary, W. Liao, R. Ross, R. Thakur, and L. Ward, "A New Flexible MPI Collective I/O Implementation," in Proceedings of the IEEE International Conference on Cluster Computing (Cluster 2006), September 2006.

2. R. Latham, R. Ross, and R. Thakur, "Can MPI Be Used for Persistent Parallel Services?," in Proceedings of the 13th European PVM/MPI Users' Group Meeting (Euro PVM/MPI 2006), September 2006, pp. 275-284.

3. J. Lee, R. Ross, S. Atchley, M. Beck, and R. Thakur, "MPI-IO/L: Efficient Remote I/O for MPI-IO via Logistical Networking," in Proceedings of the 20th IEEE International Parallel and Distributed Processing Symposium (IPDPS 2006), Rhodes Island, Greece, April 2006.

4. H. Yu, R. Sahoo, C. Howson, G. Almasi, J. Castanos, M. Gupta J. Moreira, J. Parker T. Engelsiepen, R. Ross, R. Thakur, R. Latham, and W. Gropp, "High Performance File I/O for the BlueGene/L Supercomputer," in Proceedings of the 12th International Symposium on High- Performance Computer Architecture (HPCA-12), February 2006.

5. R. Thakur, R. Ross, and R. Latham, "Implementing Byte-Range Locks Using MPI One-Sided Communication," Proc. of the 12th European PVM/MPI Users' Group Meeting (Euro PVM/MPI 2005), Recent Advances in Parallel Virtual Machine and Message Passing Interface, Lecture Notes in Computer Science, LNCS 3666, Springer, September 2005, pp. 119-128.

6. R. Latham, R. Ross, R. Thakur, and B. Toonen, "Implementing MPI-IO Shared File Pointers without File System Support," Proc. of the 12th European PVM/MPI Users' Group Meeting (Euro PVM/MPI 2005), Recent Advances in Parallel Virtual Machine and Message Passing Interface, Lecture Notes in Computer Science, LNCS 3666, Springer, September 2005, pp. 84-93.

7. R. Ross, R. Latham, W. Gropp, R. Thakur, and B. Toonen, "Implementing MPI-IO Atomic Mode Without File System Support," Proc. of the 5th IEEE/ACM International Symposium on Cluster Computing and the Grid (CCGrid 2005), Cardiff, UK, May 2005.

8. P. Carns, W. Ligon, R. Ross and P. Wyckoff, "BMI: A Network Abstraction Layer for Parallel I/O," Workshop on Communication Architecture for Clusters, Proceedings of IPDPS '05, Denver, CO, April 2005.

9. J. Lee, X. Ma, R. Ross, R. Thakur, and M. Winslett, "RFS: Implementing Efficient and Flexible Remote File Access for MPI-IO," Proceedings of Cluster 2004, September 2004.

10. W. Gropp, R. Ross, and N. Miller, "Providing Efficient I/O Redundancy in MPI Environments," Proceedings of EuroPVM/MPI 2004, September 2004.

11. R. Latham, R. Ross, and R. Thakur, "The Impact of File Systems on MPI-IO Scalability," Proceedings of EuroPVM/MPI 2004, September 2004.

12. J. Wu, P. Wyckoff, D. Panda, and R. Ross, "Unifier: Unifying Cache Management and Communication Buffer Management for PVFS over InfiniBand," Proceedings of CCGrid2004, Chicago, April 2004.

13. M. Vilayannur, R. Ross, P. Carns, R. Thakur, A. Sivasubramaniam, and M. Kandemir, "On the Peformance of the POSIX I/O Interface to PVFS," in Proc. of the 12th Euromicro Conference on Parallel, Distributed, and Network-based Processing, February 2004, pp. 332-339.

14. A. Ching, A. Choudhary, W. Liao, R. Ross, and W. Gropp, "Efficient Structured Data Access in Parallel File Systems," Proceedings of Cluster 2003, Hong Kong, November 2003.

15. J. Li, W. Liao, A. Choudhary, R. Ross, R. Thakur, W. Gropp, R. Latham, A. Siegel, B. Gallagher, and M. Zingale, "Parallel netCDF: A High-Performance Scientific I/O Interface," Proceedings of SC2003, Phoenix, AZ, November 2003.

16. R. Ross, N. Miller, and W. Gropp, "Implementing Fast and Reusable Datatype Processing," Proceedings of EuroPVM/MPI 2003, Venice, September 2003.

17. A. Ching, A. Choudhary, K. Coloma, W. Liao, R. Ross, and W. Gropp, "Noncontiguous I/O Accesses Through MPI-IO," Proceedings of CCGrid2003, Tokyo, May 2003.

18. M. Vilayannur, A. Sivasubramaniam, M. Kandemir, R. Thakur, and R. Ross, "Discretionary Caching for I/O on Clusters," Proceedings of CCGrid2003, Tokyo, May 2003.

19. A. Ching, A. Choudhary, W. Liao, R. Ross, and W. Gropp, "Noncontiguous I/O through PVFS," Proceedings of Cluster 2002, Chicago, September 2002.

20. R. Ross, D. Nurmi, A. Cheng, and M. Zingale, "A Case Study in Application I/O on Linux Clusters," Proceedings of SC2001, Denver, CO, November 2001.

21. P. Carns, W. Ligon III, R. Ross, and R. Thakur, "PVFS: A Parallel File System For Linux Clusters," Proceedings of the 4th Annual Linux Showcase and Conference, Atlanta, GA, October 2000, pp. 317–327 (won the Best Paper Award).

22. W. Ligon III and R. Ross, "An Overview of the Parallel Virtual File System," Proceedings of the 1999 Extreme Linux Workshop, Monterey, CA, June 1999.

23. P. Carns, W. Ligon III, S. McMillan, and R. Ross, "An Evaluation of Message Passing Implementations on Beowulf Workstations," Proceedings of the 1999 IEEE Aerospace Conference, Snowmass, CO, March 1999.

24. M. Cettei, W. Ligon III, and R. Ross, "Support for Parallel Out of Core Applications on Beowulf Workstations," Proceedings of the 1998 IEEE Aerospace Conference, Snowmass, CO, March 1998.

25. R. Geist and R. Ross, "Disk Scheduling Revisited: Can $O(N^2)$ Algorithms Compete?", Proceedings of the 35th Annual ACM Southeast Conference, Murfreesboro, TN, April 1997.

26. W. Ligon III and R. Ross, "Implementation and Performance of a Parallel File System for High Performance Distributed Applications," Proceedings of the Fifth IEEE International Symposium on High Performance Distributed Computing (HPDC), Syracuse, NY, August 1996.

Invited Talks at Major Conferences

1. R. Ross, "Achievements and Challenges for I/O in Computational Science," SciDAC 2005, San Francisco, CA, June 2005.

2. R. Ross, "PVFS: The Parallel Virtual File System," Storage Networking Industry Association Developer Solutions Conference & Showcase, San Jose, CA, August 2005.

3. R. Ross, "The Parallel I/O Software Crisis," ISC, Heidelberg, Germany, June 2005.

4. R. Ross, "PVFS2: Parallel I/O for Scientific Applications," ClusterWorld 2004, San Jose, CA, April 2004.

5. R. Ross, "Providing Parallel I/O on Linux Clusters," Second Annual Linux Storage Management Workshop, Miami, FL, October 2000.

Seminars

1. R. Ross, "A Department of Energy Perspective on Parallel I/O," The 2006 Workshop on Cluster Storage Technology (CluStor 2006), Heidelberg, Germany, September 2006.

2. R. Ross, "PVFS in Production," Sandia National Laboratories, Albuquerque, NM, July 2006.

3. R. Ross, "Trends and Techniques in Parallel I/O Systems," Invited Speaker Series, School of Computing and Information Sciences, Florida International University, Miami, FL, January 2006.

4. R. Ross, T. Baer, A. Ching, D. Hildebrand, and R. Latham, "PVFS2 Birds of a Feather Session," SC2005, Seattle, WA, November 2005.

5. R. Ross, "Building Effective I/O Solutions for HPC," Computer Sciences and Mathematics Division Seminar, Oak Ridge National Laboratory, Oak Ridge, TN, August 2005.

6. R. Ross, "Building Parallel File Systems for Computational Science," Fulton HPC Distinguished Lecture Series, Arizona State University, Tempe, AZ, April 2005.

7. R. Ross, "PVFS2 and Parallel I/O on BG/L," BG/L Consortium System Software Workshop, Salt Lake City, UT, February 2005.

8. R. Ross, "The Future of Parallel I/O Systems in Computational Science," Workshop on System-Integrated Load and Resource Management, University of Heidelberg, Heidelberg, Germany, November 2004.

9. R. Ross, R. Latham, W. Ligon, and N. Miller, "PVFS2 Birds of a Feather Session," SC2004, Pittsburgh, PA, November 2004.

10. R. Ross, "Connecting HPIO Capabilities with Domain Specific Needs," DOE Office of Science Data-Management Workshop, Menlo Park, CA, March 2004.

11. R. Ross, "Bridging the I/O Gap: Matching I/O Systems to Application Domains," Center for Computing Sciences Colloquium Series, Institute for Defense Analysis, Bowie, MD, March 2004.

12. R. Ross, W. Ligon, P. Carns, R. Latham, and N. Miller, "PVFS Birds of a Feather Session," SC2003, Phoenix, AZ, November 2003.

13. R. Ross, "Parallel I/O Systems: Architecture and Performance," Systems Seminar Series, Ohio State University, Columbus, OH, April 2003.

14. R. Ross and W. Ligon, "PVFS Birds of a Feather Session," SC2002, Baltimore, MD, November 2002.

15. R. Ross, "Making Best Use of PVFS," Cluster Focus Group Meeting, Ohio Supercomputer Center, Columbus, OH, April 2002.

16. R. Ross, "A Case Study in Application I/O on Linux Clusters," SC2001, Denver, CO, November 2001.

17. R. Ross, "Revisiting the Parallel I/O Problem," Lawrence Livermore National Laboratory, Livermore, CA, October 2001.

18. R. Ross, "Using Parallel I/O on Linux Clusters," NASA Jet Propulsion Laboratory, High Performance Computing Group, Pasadena, CA, July 2001.

19. R. Ross, "Playing with Parallel I/O on Linux Clusters," University of Chicago, Chicago, February 2001.

20. R. Ross, "Reactive Scheduling for Parallel I/O Systems," Argonne National Laboratory, Chicago, May 2000.

21. R. Ross, "The Parallel Virtual File System: Past, Present, and Future," Argonne National Laboratory, Chicago, April 1999.

22. R. Ross, "Message Passing and Parallel File Systems for Beowulf Machines," NASA Goddard Space Flight Center, Greenbelt, MD, April 1999.

Tutorials

1. R. Latham, W. Loewe, R. Ross, R. Thakur, "Parallel I/O in Practice," SC2006, Tampa, FL, November 2006.

2. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2006, Tampa, FL, November 2006.

3. R. Latham and R. Ross, "Parallel I/O in Practice," Cluster 2006, Barcelona, Spain, September 2006.

4. R. Ross and J. Worringen, "High-Performance Parallel I/O," EuroPVM/MPI 2006, Bonn, Germany, September 2006.

5. R. Ross, "Parallel I/O in Practice", Sandia National Laboratories, Albuquerque, NM, July, 2006.

6. R. Latham, W. Loewe, R. Ross, R. Thakur, "Parallel I/O in Practice," SC2005, Seattle, WA, November 2005.

7. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2005, Seattle, WA, November 2005.

8. R. Latham and R. Ross, "High-Performance I/O for Scientific Applications," CCGrid 2005, Cardiff, UK, May 2005.

9. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "Advanced MPI: I/O and One-Sided Communication," SC2004, Pittsburgh, PA, November 2004.

10. R. Ross and R. Thakur, "Using MPI-2: A Tutorial on Advanced Features of the Message-Passing Interface Standard," CCGrid 2004, Chicago, April 2004.

11. R. Ross, "High-Performance I/O for Scientific Applications," ClusterWorld 2004, San Jose, CA, April 2004.

12. R. Ross and R. Thakur, "Using MPI-2: A Tutorial on Advanced Features of the Message-Passing Interface Standard," Grid and Cluster Computing Conference (GCC) 2003, Shanghai, China, December 2003.

13. W. Gropp, E. Lusk, R. Ross, and R. Thakur, "Using MPI-2: A Tutorial on Advanced Features of the Message-Passing Interface Standard," SC2003, Phoenix, AZ, November 2003.

14. E. Lusk, W. Gropp, R. Ross, and R. Thakur, "High-Level Programming with MPI," EuroPVM/MPI 2003, Venice, September 2003.

15. W. Gropp, E. Lusk, R. Ross, and R. Thakur, "Using MPI-2: A Tutorial on Advanced Features of the Message-Passing Interface Standard," SC2002, Baltimore, MD, November 2002.

16. W. Gropp, E. Lusk, R. Ross, and R. Thakur, "Using MPI-2: A Tutorial on Advanced Features of the Message-Passing Interface Standard," SC2001, Denver, CO, November 2001.

17. W. Ligon III and R. Ross, "The Parallel Virtual File System for Commodity Clusters," IEEE Cluster 2001, Newport Beach, CA, October 2001.

18. R. Ross, "Enabling Parallel I/O on Linux Clusters," part of "Design and Analysis of High Performance Clusters" tutorial with R. Pennington, P. Kovatch, B. Maccabe, and D. Bader, SC2000, Dallas, TX, November 2000.

Magazine Articles

1. N. Miller, R. Latham, R. Ross, and P. Carns, "Improving Cluster Performance with PVFS2," ClusterWorld Magazine, Volume 2, Number 4, April 2004.

2. R. Latham, N. Miller, R. Ross, and P. Carns, "A Next-Generation Parallel File System for Linux Clusters," LinuxWorld Magazine, Volume 2, Issue 1, January 2004.

3. D. Becker, W. Ligon III, P. Merkey, and R. Ross, "Beowulf: Low-Cost Supercomputing Using Linux" (sidebar), IEEE Software, January/February 1999.